SOILS

Soil

Natural body that occurs on the land surface, occupies space, and is characterized by one or both of the following:

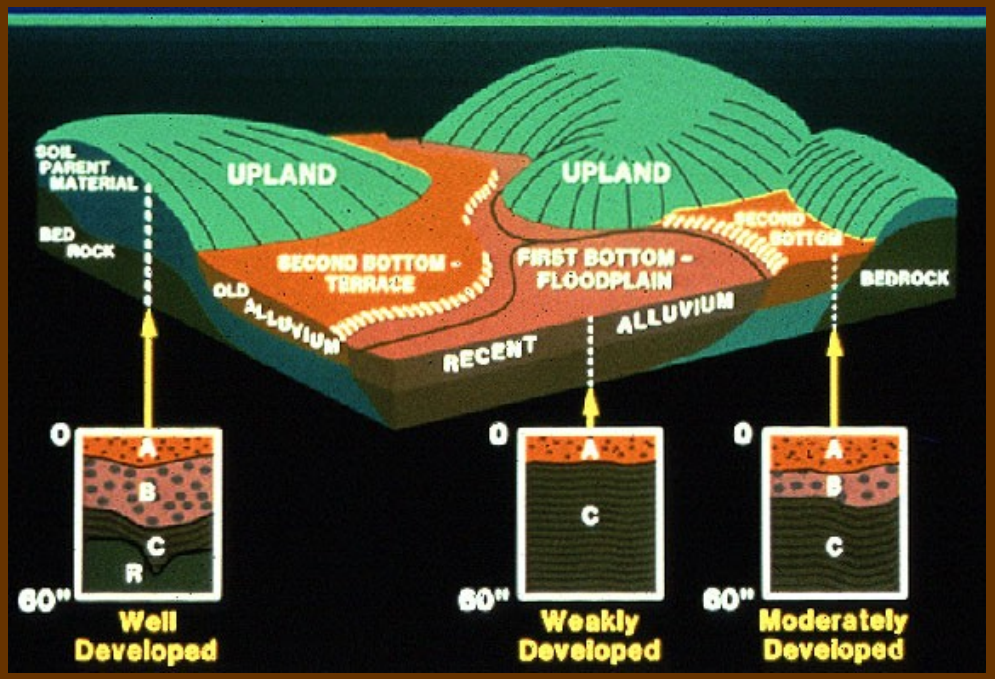
- Horizons or layers, or . . .
- The ability to support rooted plants in a natural environment
  - Upper limit is air or shallow (>2.5 m) water
  - Lower limit is either bedrock or the limit of biological activity
  - Lower limit for classification set at an arbitrary 2 m

Nonsoil

- Badlands
- Beaches
- Rubble lands
- Rock outcrops
- Glaciers
- Deepwater habitats

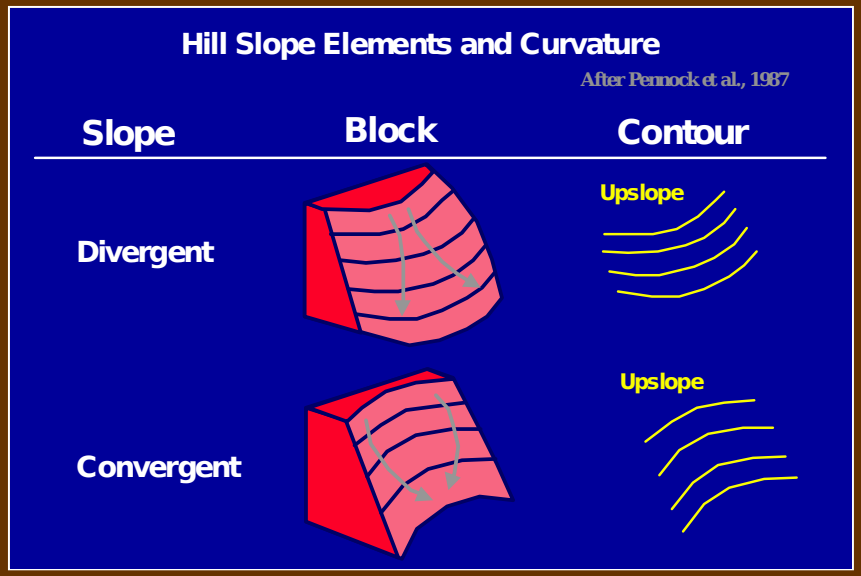
Factors That Influence Soil Development

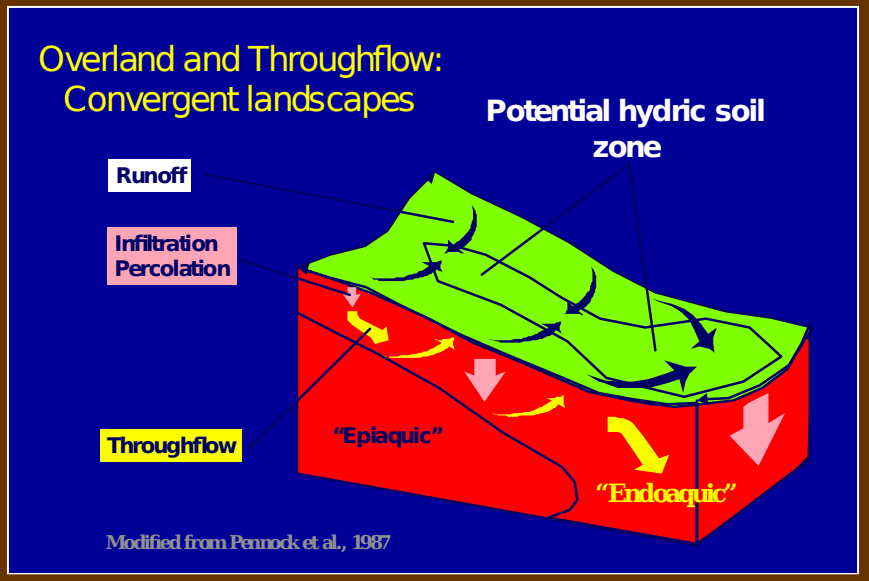
- Climate
- Parent material
- Topographical relief
- Organisms
- Time



Landscape Position

- Critically influences water flow and soil formation
- Most wetlands, even groundwater seeps, are on some sort of concave surface





Key Soil Properties

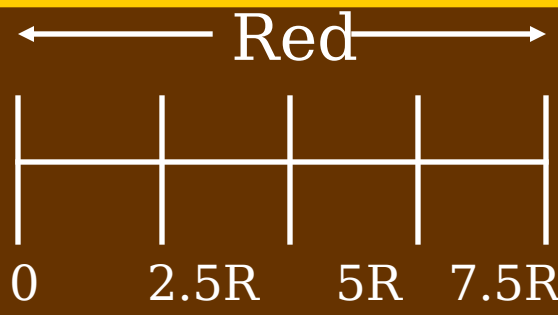
Properties that are important to hydric soil development and recognition:

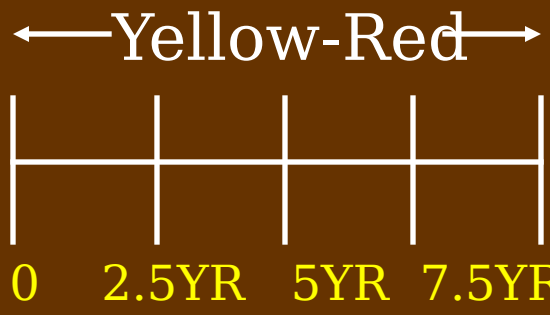
- Color
- Organic matter
- Texture
- Horizonation
- Drainage
- Permeability

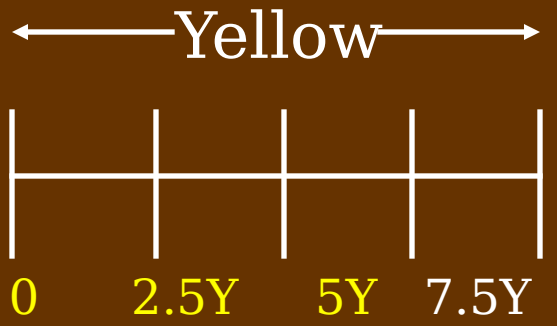
Aspects of Soil Color

- Hue
- Value
- Chroma

Hue


Red
0
2.5R
5R
7.5R
10R

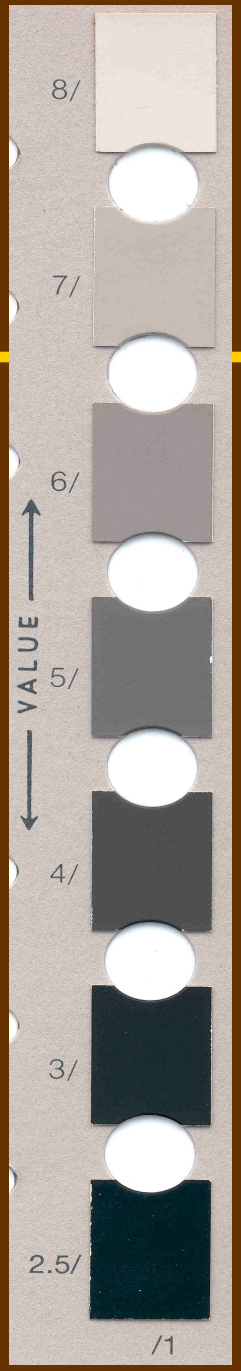

Yellow-Red
0
2.5YR
5YR
7.5YR
10YR


Yellow
0
2.5Y
5Y
7.5Y
1

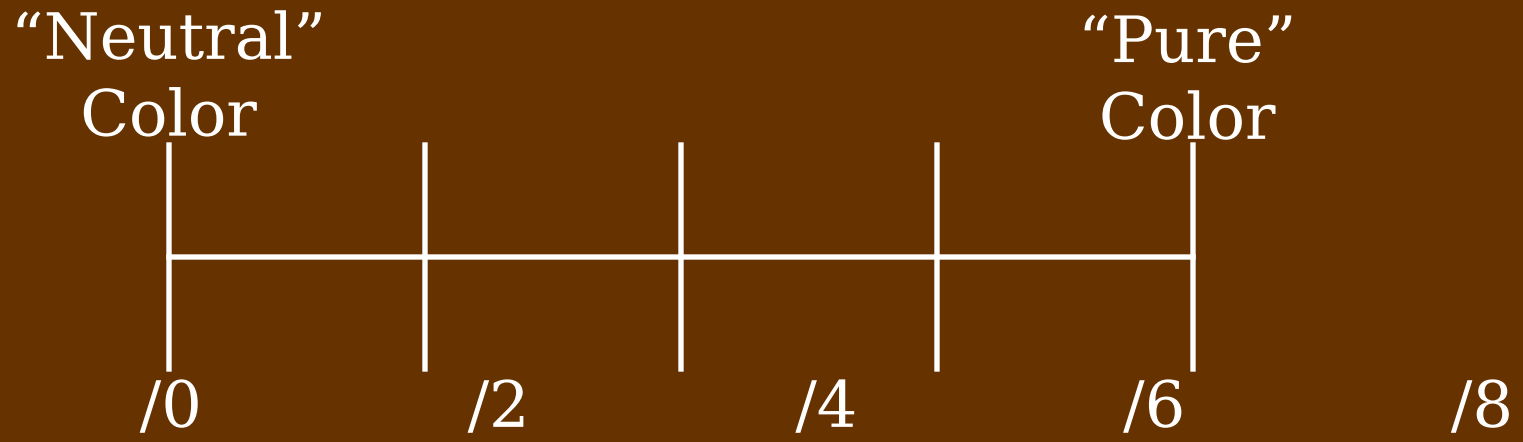
Value

The Lightness or Darkness of Color

- 10/0 - Pure White
- 5/0 - “Gray”
- 0/0 - Pure Black



Chroma

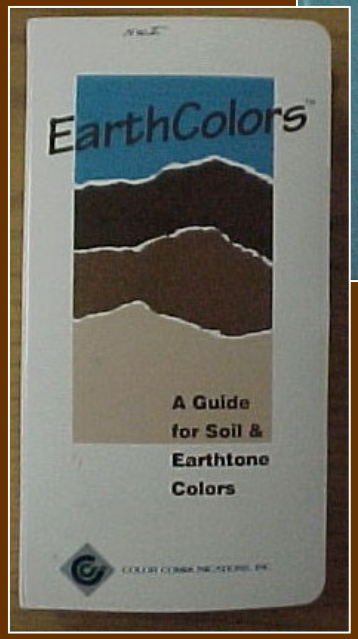

“Neutral” Color
“Pure” Color
/0
/2
/4
/6
/8
Increasing strength
5/
Increasing grayness

Soil Color

Munsell Soil Color Book, 7.5YR page

Munsell® or Earth Colors ®

- The Munsell notation system is a system for recording color.
- The Earth Colors and Munsell books use the same colors.



– Differences are from personal interpretation of color, fading of pages over time, smudging of chips with use, and quality control from the factories.

Reading Soil Colors

- Optimum conditions
  - Natural light
  - Clear, sunny day
  - Midday
  - Light at right angles
  - Soil moist

Color Patterns in Soils

- Matrix (predominant) color
- Mottle colors (Redox Features)
  - Concentrations
  - Depletions
- Contrast, abundance, and size

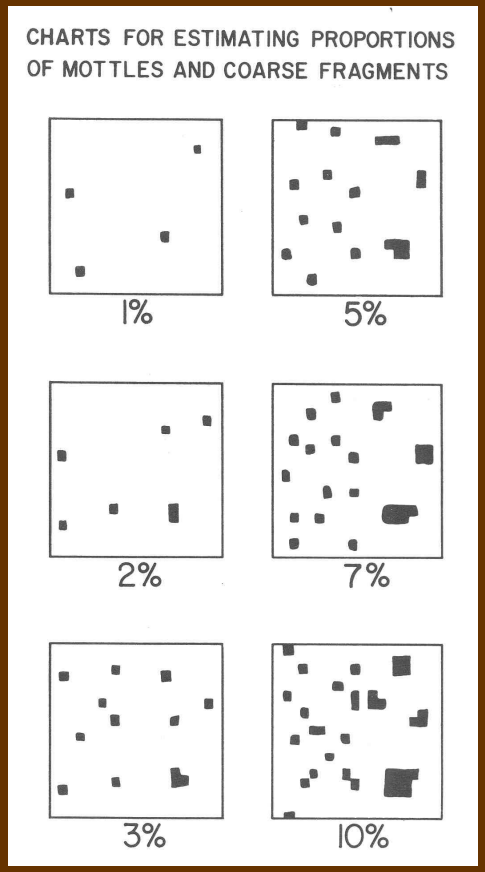
Contrast of Mottles

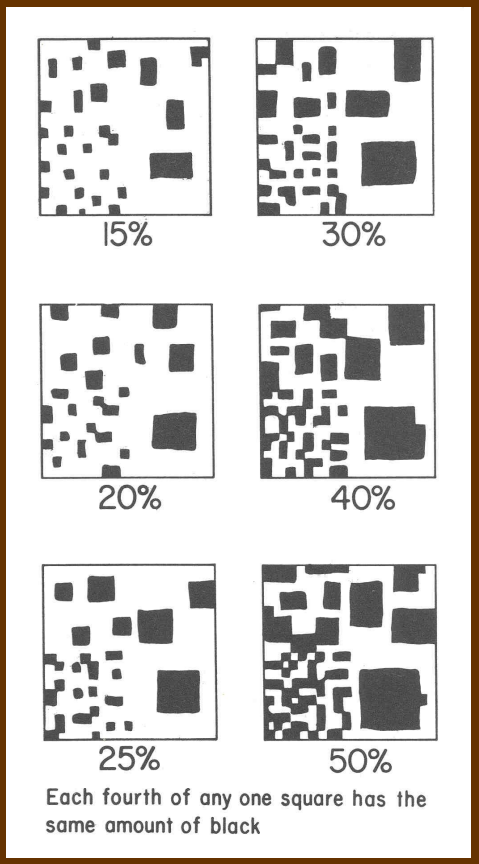
- Contrast refers to the degree of visual distinction between associated colors
  - Faint -- evident only on close examination
  - Distinct -- readily seen
  - Prominent -- contrast strongly

Abundance and Size of Mottles

- Few -- less than 2%
- Common -- 2 to 20%
- Many -- more than 20%

- Fine -- < 5 mm
- Medium -- 5 to 15 mm
- Coarse -- > 15 mm





Two Categories of Soil Material

Differ in organic matter content:

- Organic horizons
- Mineral horizons

Two Categories of Soil Material

Organic horizons

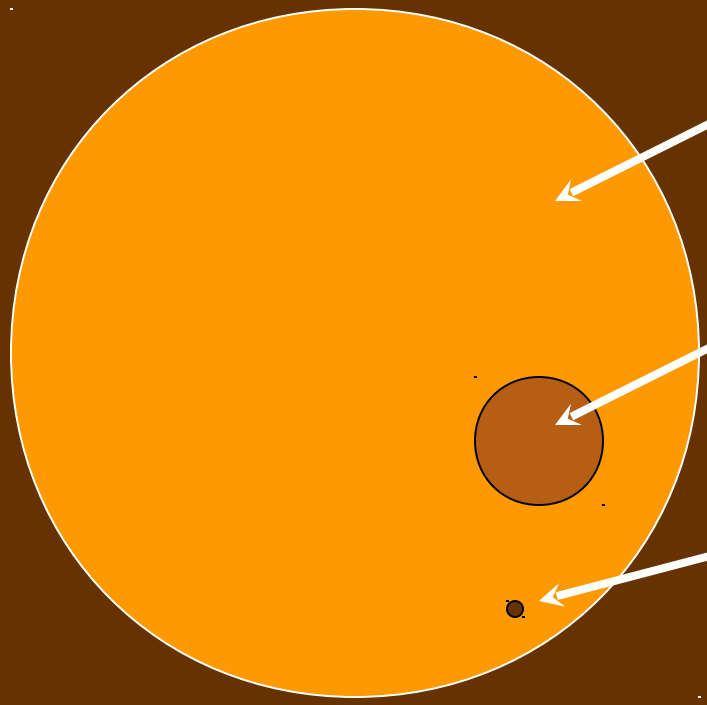
- Consist of decomposed organic material
- An organic soil has at least 16 inches of decomposed organic material in the upper 32 inches, or any thickness over bedrock

Two Categories of Soil Material

Mineral horizons

- Primarily sand, silt, and clay, with varying amounts of organic matter

Relative Sizes of Soil Particles

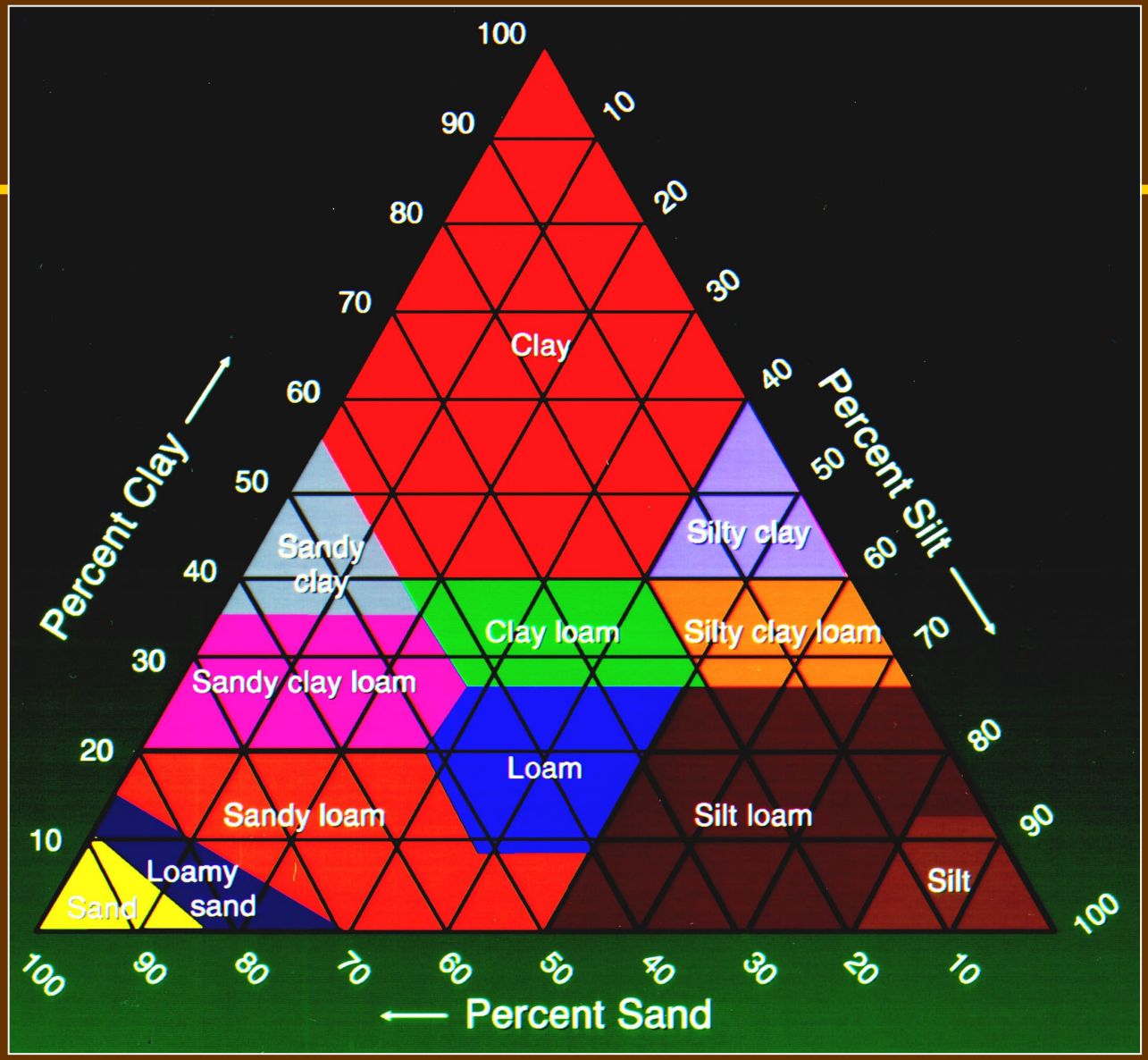


Sand (0.05-2.00 mm)

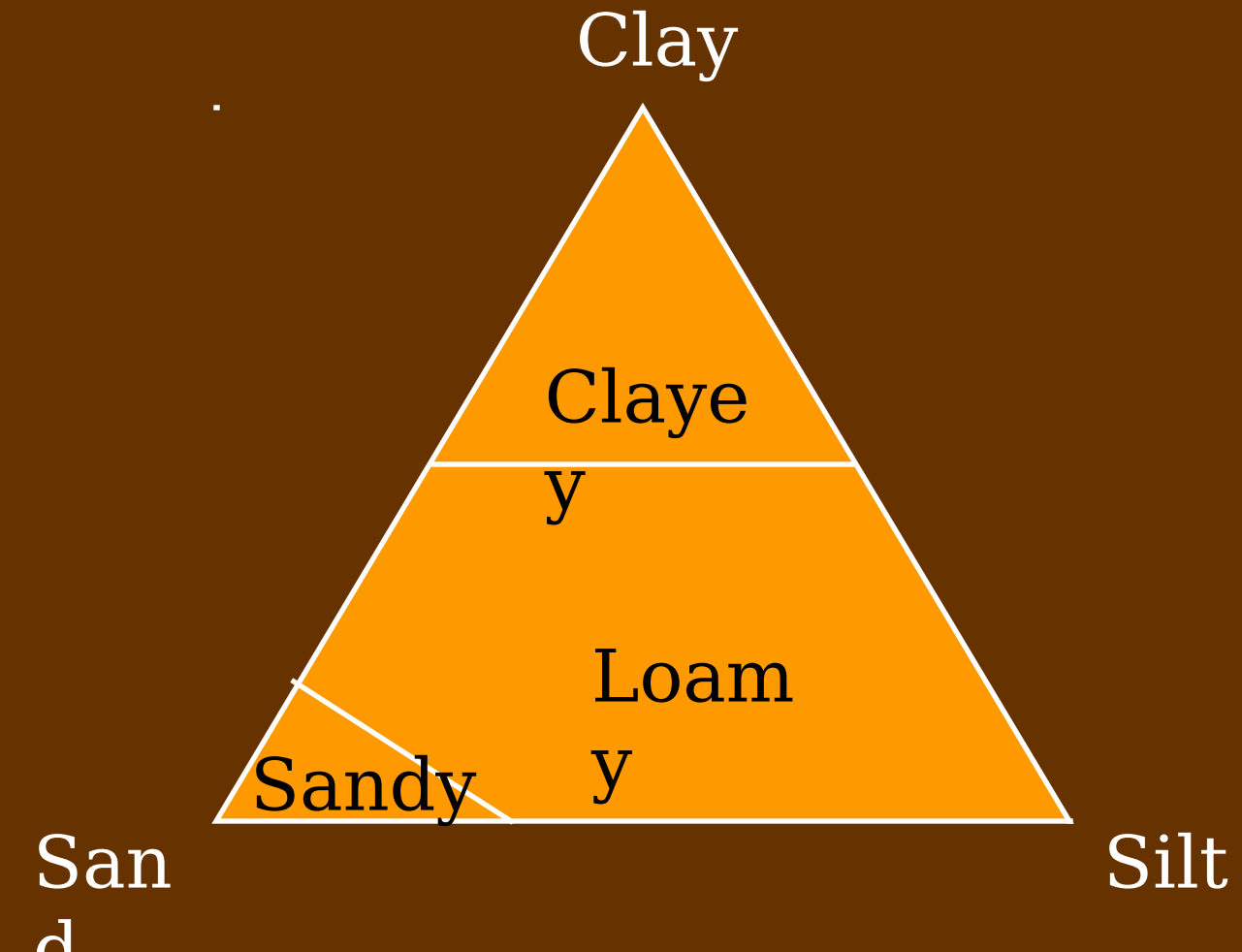
Silt (0.002-0.05 mm)

Clay (<0.002 mm)

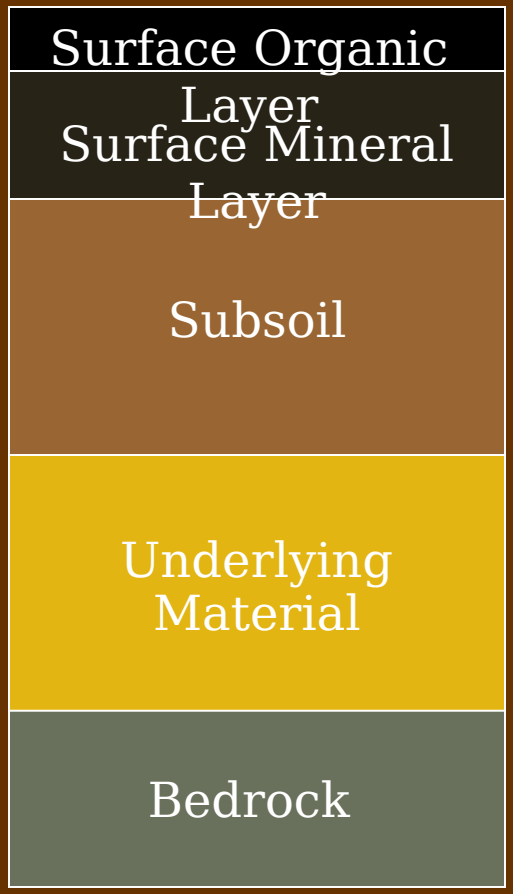
Soil Texture Triangle



“Basic” Soil Texture Triangle



Major Horizon Designations



O horizon

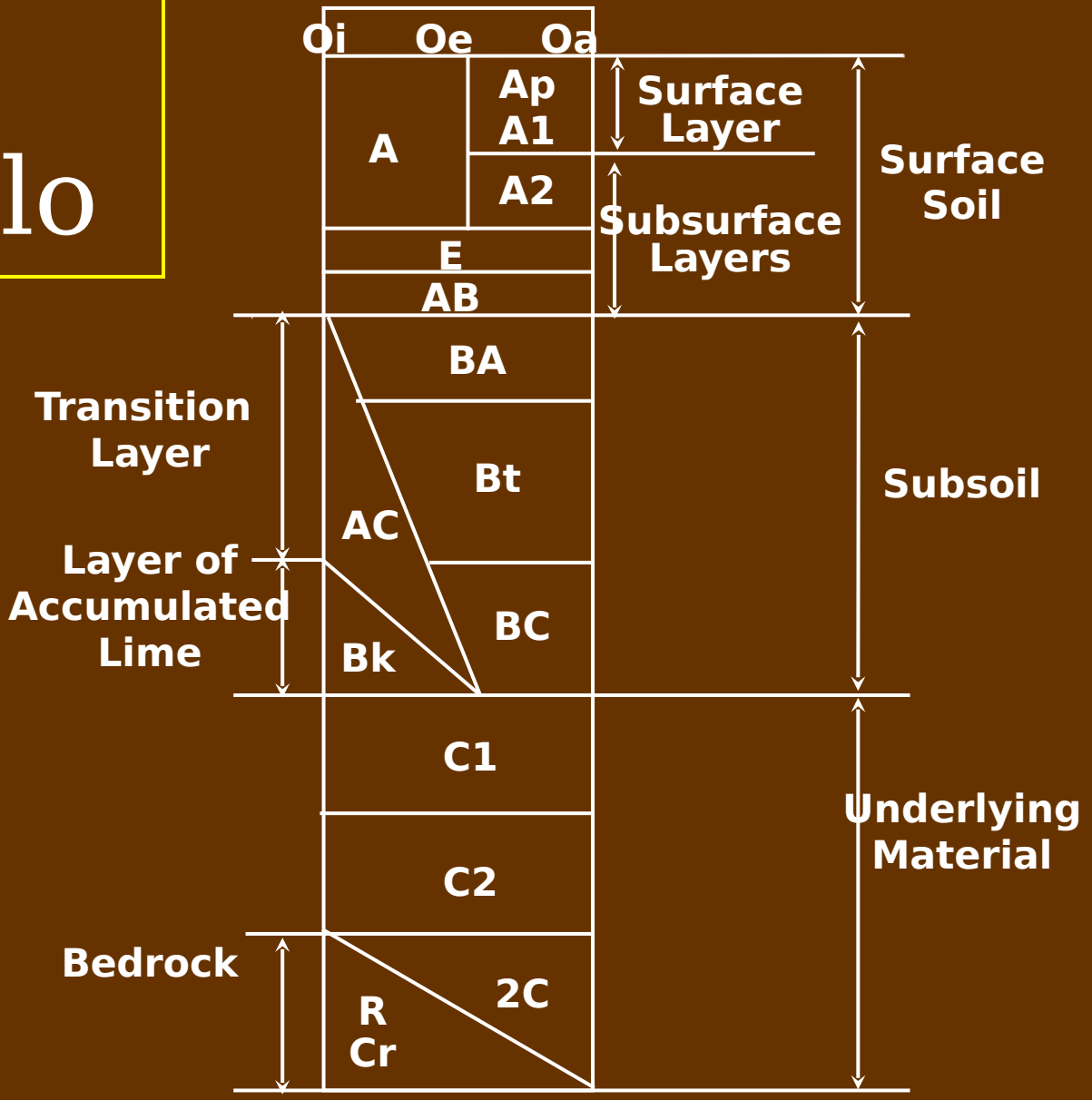
A Horizon

B Horizon

C Horizon

R Horizon

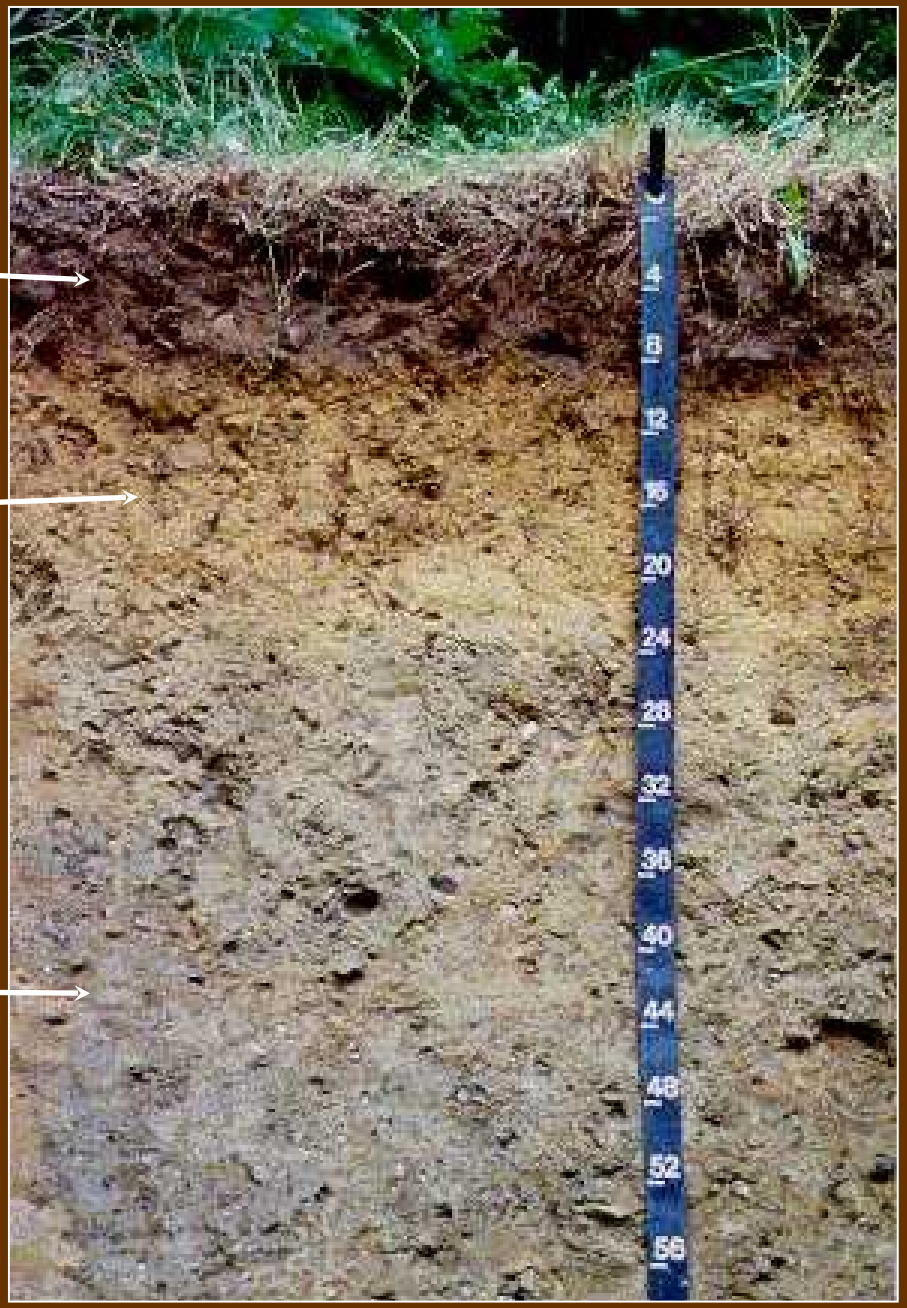
Horizon Terminology



A horizon

Bw horizon

C horizon



A horizon

E horizon

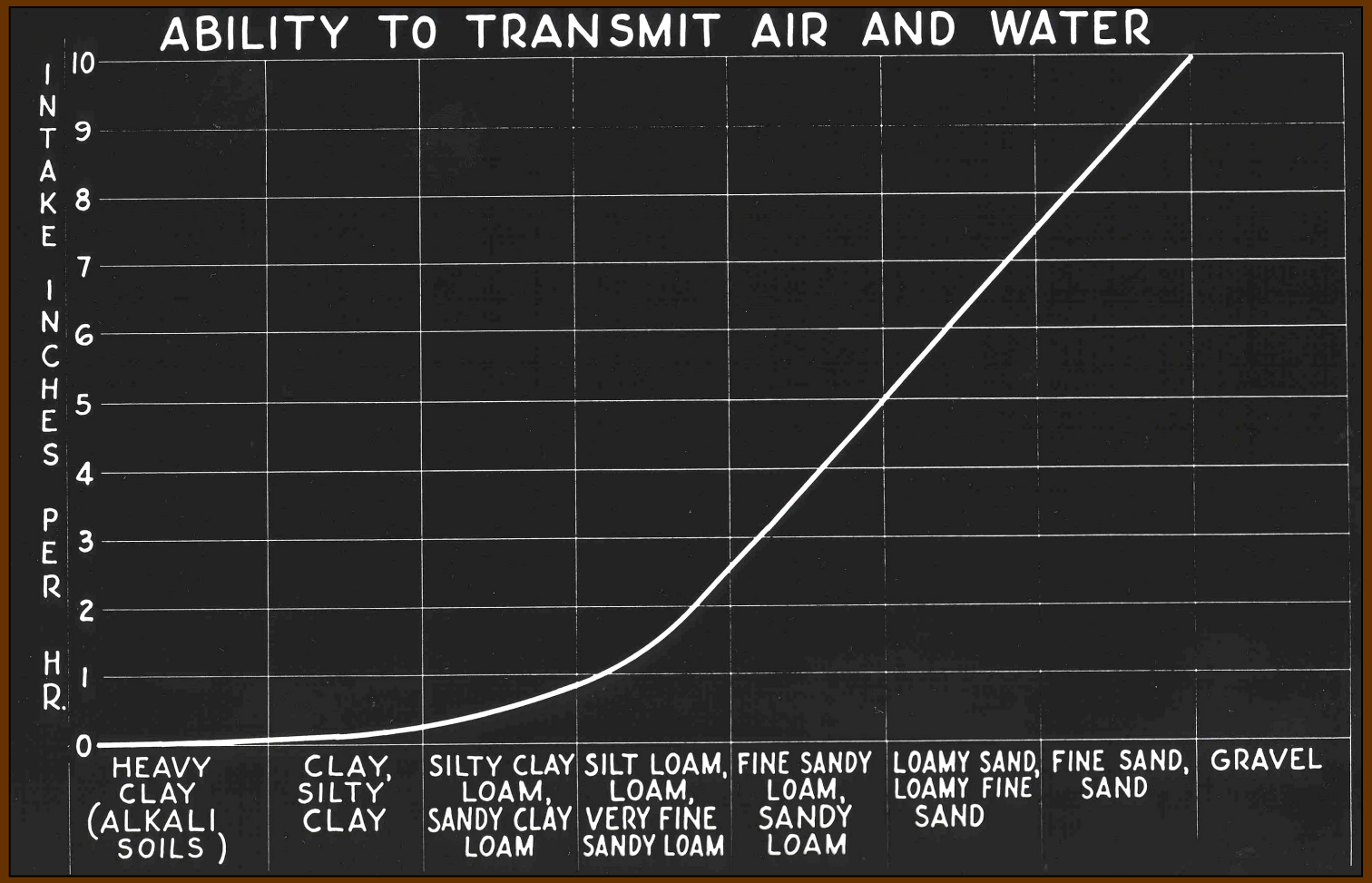
Bh horizon

Bs horizon

Permeability

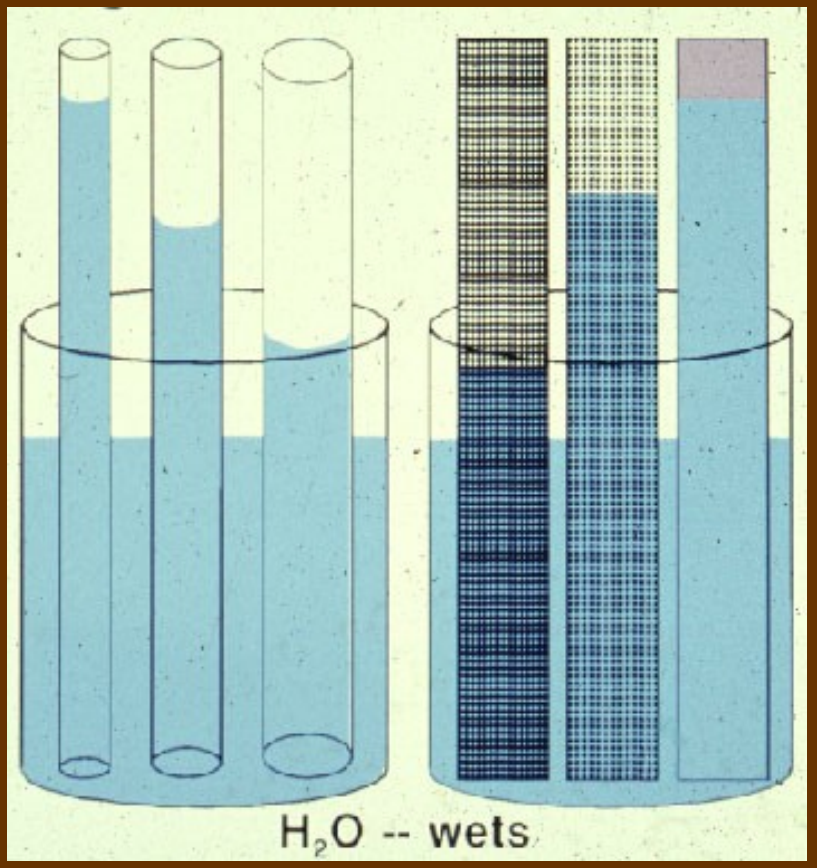
- A measure of the ability of water or air to move through the soil profile
- Permeability is “measured” in inches per hour
  - Permeability is actually an estimated property based primarily on texture and structure
  - Measured values are saturated hydraulic conductivity

Permeability



Capillary Fringe

- Based upon permeability
- The zone above the free water table that is effectively saturated
  - Water held at tension
  - Theoretical values much higher than “real life”
  - Difficult to measure



Drainage Classes

- Excessively drained
- Somewhat excessively drained
- Well drained
- Moderately well drained
- Somewhat poorly drained
- Poorly drained
- Very poorly drained

Drainage Classes